



AiP74HC/HCT123

Dual Retriggerable Monostable Multivibrator with Reset

Product Specification

Specification Revision History:

Version	Date	Description
2012-06-A1	2012-06	New
2023-04-B1	2023-04	Update the template
2026-07-B2	2026-07	Add DHVQFN16 package form; update package information



Contents

1、General Description.....	4
2、Block Diagram And Pin Description	7
2.1、Block Diagram	7
2.2、Pin Configurations.....	9
2.3、Pin Description.....	9
2.4、Function Table.....	10
3、Electrical Parameter	10
3.1、Absolute Maximum Ratings.....	10
3.2、Recommended Operating Conditions.....	11
3.3、Electrical Characteristics.....	11
3.3.1、DC Characteristics 1	11
3.3.2、DC Characteristics 2	12
3.3.3、DC Characteristics 3.....	13
3.3.4、AC Characteristics 1	14
3.3.5、AC Characteristics 2.....	16
3.3.6、AC Characteristics 3.....	18
4、Testing Circuit	19
4.1、AC Testing Circuit	19
4.2、AC Testing Waveforms.....	20
4.3、Measurement Points	22
4.4、Test Data	22
5、Typical Application Circuit And Application Note	23
5.1、Timing component connections	23
5.2、Power-up considerations	23
5.3、Power-down considerations	24
6、Package Information	25
6.1、DIP16	25
6.2、SOP16	26
6.3、TSSOP16.....	27
6.4、DHVQFN16	28
7、Statements And Notes	29



7.1、The name and content of Hazardous substances or Elements in the product	29
7.2、Notes	29

i-core



1、General Description

The AiP74HC/HCT123 are high-speed Si-gate CMOS devices and are pin compatible with Low-power Schottky TTL (LSTTL).

The AiP74HC/HCT123 are dual retriggerable monostable multivibrators with output pulse width control by three methods:

1. The basic pulse is programmed by selection of an external resistor (R_{EXT}) and capacitor (C_{EXT}).
2. Once triggered, the basic output pulse width may be extended by retriggering the gated active LOW-going edge input ($\overline{nA}$) or the active HIGH-going edge input (nB). By repeating this process, the output pulse period ($nQ=HIGH$, $\overline{nQ}=LOW$) can be made as long as desired. Alternatively an output delay can be terminated at any time by a LOW-going edge on input $\overline{nRD}$, which also inhibits the triggering.
3. An internal connection from $\overline{nRD}$ to the input gates makes it possible to trigger the circuit by a HIGH-going signal at input $\overline{nRD}$.

Features:

- DC triggered from active HIGH or active LOW inputs
- Retriggerable for very long pulses up to 100% duty factor
- Direct reset terminates output pulse
- Specified from $-40^{\circ}C$ to $+125^{\circ}C$
- Packaging information: DIP16/SOP16/TSSOP16/DHVQFN16

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74HC123DA16.TB	DIP16	74HC123	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT123DA16.TB	DIP16	74HCT123	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC123SA16.TB	SOP16	74HC123	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT123SA16.TB	SOP16	74HCT123	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC123TA16.TB	TSSOP16	74HC123	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT123TA16.TB	TSSOP16	74HCT123	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

**Reel packing specifications:**

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74HC123SA16.TR	SOP16	74HC123	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HCT123SA16.TR	SOP16	74HCT123	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HC123TA16.TR	TSSOP16	74HC123	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
AiP74HCT123TA16.TR	TSSOP16	74HCT123	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
AiP74HC123QE16.TR	DHVQFN16	74HC123	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.5mm×2.5mm Pin spacing: 0.50mm
AiP74HCT123QE16.TR	DHVQFN16	74HCT123	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.5mm×2.5mm Pin spacing: 0.50mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



2、Block Diagram And Pin Description

2.1、Block Diagram

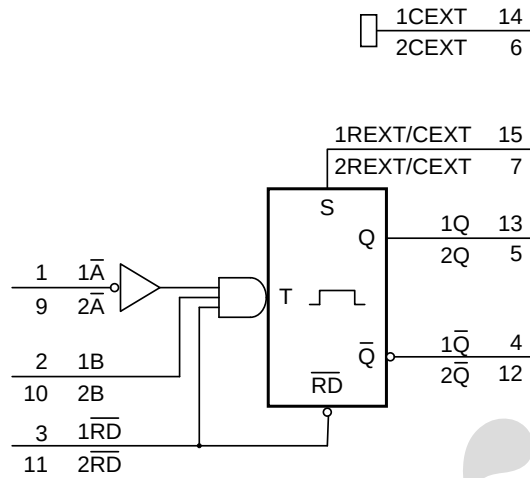


Figure 1. Logic symbol

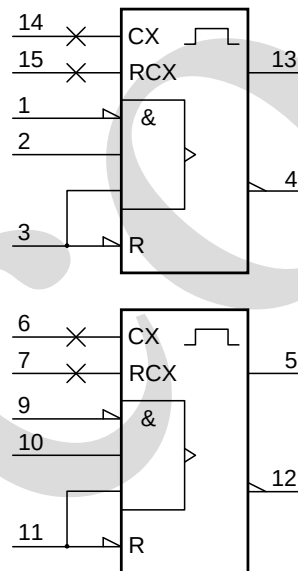


Figure 2. IEC logic symbol

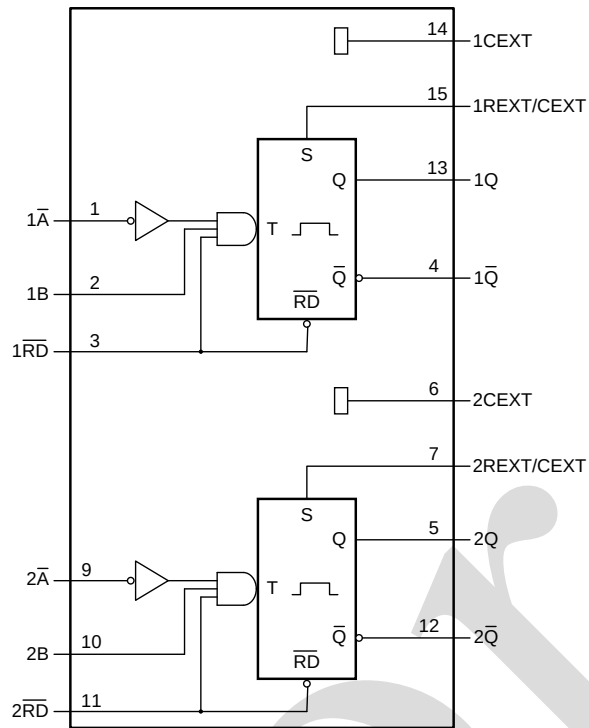


Figure 3. Functional diagram

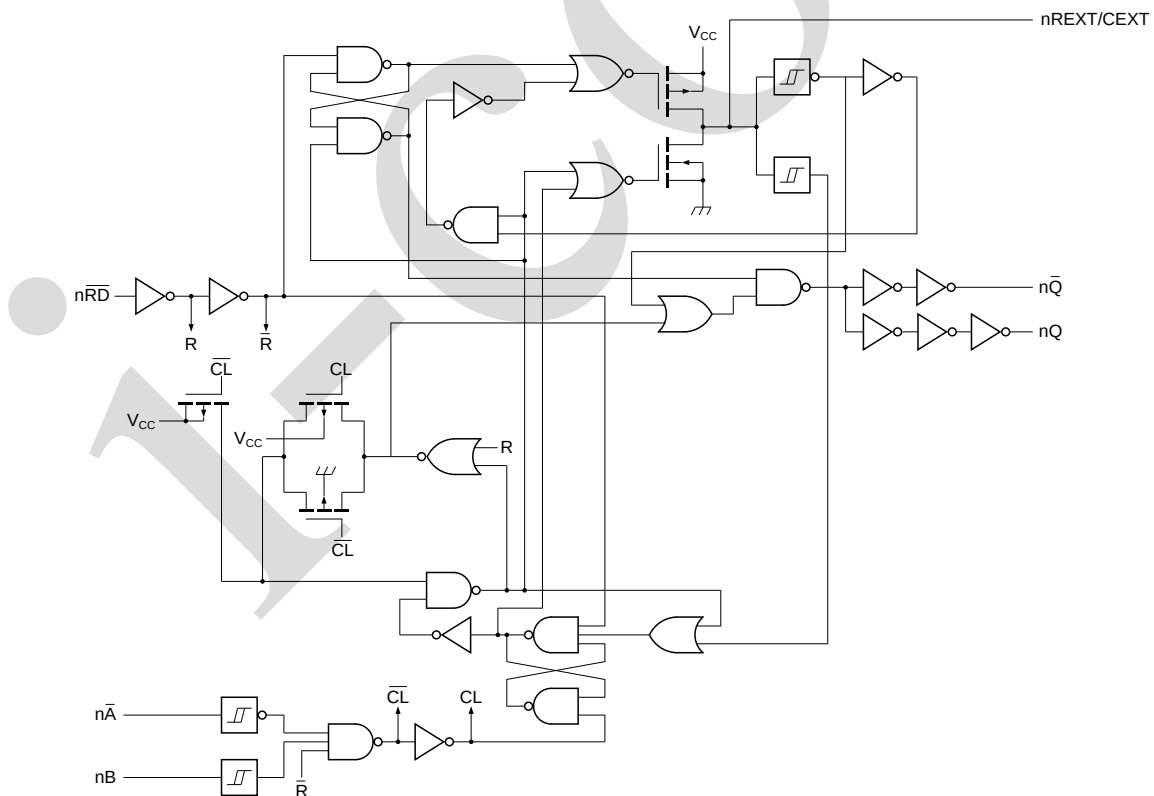
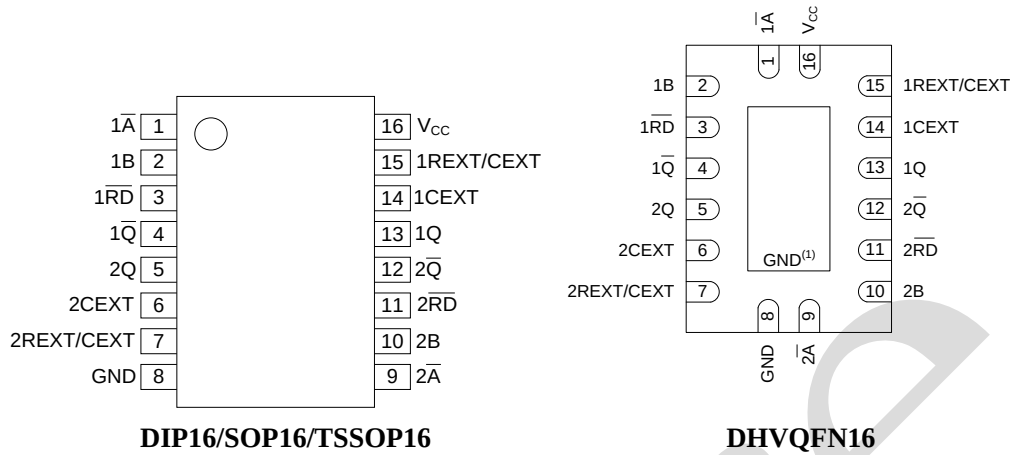


Figure 4. Logic diagram



2.2、Pin Configurations



Note: (1) If it is soldered, the solder land should remain floating or be connected to GND.

2.3、Pin Description

Pin No.	Pin Name	Description
1	1A	negative-edge triggered input 1
2	1B	positive-edge triggered input 1
3	1RD	direct reset LOW and positive-edge triggered input 1
4	1Q	active LOW output 1
5	2Q	active HIGH output 2
6	2CEXT	external capacitor connection 2
7	2REXT/CEXT	external resistor and capacitor connection 2
8	GND	ground (0V)
9	2A	negative-edge triggered input 2
10	2B	positive-edge triggered input 2
11	2RD	direct reset LOW and positive-edge triggered input 2
12	2Q	active LOW output 2
13	1Q	active HIGH output 1
14	1CEXT	external capacitor connection 1
15	1REXT/CEXT	external resistor and capacitor connection 1
16	V _{CC}	supply voltage



2.4、Function Table

Input			Output	
nRD	nA	nB	nQ	nQ
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑		
H	↓	H		
↑	L	H		

Note:

[1] H=HIGH voltage level; L=LOW voltage level; X=don't care.

[2] ↑=LOW-to-HIGH transition; ↓=HIGH-to-LOW transition.

[3]  =one HIGH level output pulse;  =one LOW level output pulse.

[4] If the monostable was triggered before this condition was established, the pulse will continue as programmed.

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	-		-0.5	+7.0	V
input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$		-	±20	mA
output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$		-	±20	mA
output current	I_O	except for pins nREXT/CEXT; $V_O = -0.5V$ to $(V_{CC}+0.5V)$		-	±25	mA
supply current	I_{CC}	-		-	50	mA
ground current	I_{GND}	-		-	-50	mA
storage temperature	T_{stg}	-		-65	+150	°C
total power dissipation	P_{tot}	-		-	500	mW
soldering temperature	T_L	10s	DIP	245		°C
			SOP/TSSOP/DHVQFN	260		°C



3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74HC123						
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	$\overline{nRD}$ input	$V_{CC}=2.0V$	-	-	625 ns/V
			$V_{CC}=4.5V$	-	1.67	139 ns/V
			$V_{CC}=6.0V$	-	-	83 ns/V
ambient temperature	T_{amb}	-	-40	-	+125	°C
AiP74HCT123						
supply voltage	V_{CC}	-	4.5	5.0	5.5	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	$\overline{nRD}$ input	$V_{CC}=2.0V$	-	-	- ns/V
			$V_{CC}=4.5V$	-	1.67	139 ns/V
			$V_{CC}=6.0V$	-	-	- ns/V
ambient temperature	T_{amb}	-	-40	-	+125	°C

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

($T_{amb}=25^{\circ}C$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC123							
HIGH-level input voltage	V _{IH}	V _{CC} =2.0V		1.5	1.2	-	V
		V _{CC} =4.5V		3.15	2.4	-	V
		V _{CC} =6.0V		4.2	3.2	-	V
LOW-level input voltage	V _{IL}	V _{CC} =2.0V		-	0.8	0.5	V
		V _{CC} =4.5V		-	2.1	1.35	V
		V _{CC} =6.0V		-	2.8	1.8	V
HIGH-level output voltage	V _{OH}	V _I =V _{IH} or V _{IL}	I _O =-20uA; V _{CC} =2.0V	1.9	2.0	-	V
			I _O =-20uA; V _{CC} =4.5V	4.4	4.5	-	V
			I _O =-20uA; V _{CC} =6.0V	5.9	6.0	-	V
			I _O =-4mA; V _{CC} =4.5V	3.98	4.32	-	V
			I _O =-5.2mA; V _{CC} =6.0V	5.48	5.81	-	V
LOW-level output voltage	V _{OL}	V _I =V _{IH} or V _{IL}	I _O =20uA; V _{CC} =2.0V	-	0	0.1	V
			I _O =20uA; V _{CC} =4.5V	-	0	0.1	V
			I _O =20uA; V _{CC} =6.0V	-	0	0.1	V
			I _O =4mA; V _{CC} =4.5V	-	0.15	0.26	V
			I _O =5.2mA; V _{CC} =6.0V	-	0.16	0.26	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =6.0V		-	-	±1.0	uA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =6.0V		-	-	8.0	uA
input capacitance	C _I	-		-	3.5	-	pF



AiP74HCT123						
HIGH-level input voltage	V_{IH}	$V_{CC}=4.5V$ to $5.5V$	2.0	1.6	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=4.5V$ to $5.5V$	-	1.2	0.8	V
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=4.5V$	$I_O=-20\mu A$	4.4	4.5	V
			$I_O=-4mA$	3.98	4.32	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=4.5V$	$I_O=20\mu A$	-	0	V
			$I_O=4mA$	-	0.15	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$	-	-	± 1.0	μA
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=5.5V$	-	-	8.0	μA
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-2.1V$; other inputs at V_{CC} or GND; $V_{CC}=4.5V$ to $5.5V$; $I_O=0A$	pins $\bar{n}A$, nB	-	35	125
			pin nRD	-	50	180
input capacitance	C_I	-	-	3.5	-	pF

3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}C$ to $+85^{\circ}C$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74HC123						
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0V$	1.5	-	-	V
		$V_{CC}=4.5V$	3.15	-	-	V
		$V_{CC}=6.0V$	4.2	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$	-	-	0.5	V
		$V_{CC}=4.5V$	-	-	1.35	V
		$V_{CC}=6.0V$	-	-	1.8	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_O=-20\mu A$; $V_{CC}=2.0V$	1.9	-	V
			$I_O=-20\mu A$; $V_{CC}=4.5V$	4.4	-	V
			$I_O=-20\mu A$; $V_{CC}=6.0V$	5.9	-	V
			$I_O=-4mA$; $V_{CC}=4.5V$	3.84	-	V
			$I_O=-5.2mA$; $V_{CC}=6.0V$	5.34	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O=20\mu A$; $V_{CC}=2.0V$	-	-	0.1
			$I_O=20\mu A$; $V_{CC}=4.5V$	-	-	0.1
			$I_O=20\mu A$; $V_{CC}=6.0V$	-	-	0.1
			$I_O=4mA$; $V_{CC}=4.5V$	-	-	0.33
			$I_O=5.2mA$; $V_{CC}=6.0V$	-	-	0.33
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=6.0V$	-	-	± 1.0	μA
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=6.0V$	-	-	80	μA
AiP74HCT123						
HIGH-level input voltage	V_{IH}	$V_{CC}=4.5V$ to $5.5V$	2.0	-	-	V
LOW-level input voltage	V_{IL}	$V_{CC}=4.5V$ to $5.5V$	-	-	0.8	V



HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5V$	$I_O=-20\mu A$	4.4	-	-	V
			$I_O=-4mA$	3.84	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC}=4.5V$	$I_O=20\mu A$	-	-	0.1	V
			$I_O=4mA$	-	-	0.33	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } GND; V_{CC}=5.5V$		-	-	± 1.0	μA
supply current	I_{CC}	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=5.5V$		-	-	80	μA
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-2.1V$; other inputs at V_{CC} or $GND; V_{CC}=4.5V$ to $5.5V; I_O=0A$	pins $n\bar{A}, nB$	-	-	160	μA
			pin nRD	-	-	225	μA

3.3.3、DC Characteristics 3

($T_{amb}=-40^{\circ}C$ to $+125^{\circ}C$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC123							
HIGH-level input voltage	V _{IH}	V _{CC} =2.0V		1.5	-	-	V
		V _{CC} =4.5V		3.15	-	-	V
		V _{CC} =6.0V		4.2	-	-	V
LOW-level input voltage	V _{IL}	V _{CC} =2.0V		-	-	0.5	V
		V _{CC} =4.5V		-	-	1.35	V
		V _{CC} =6.0V		-	-	1.8	V
HIGH-level output voltage	V _{OH}	V _I = V _{IH} or V _{IL}	I _O =-20uA; V _{CC} =2.0V	1.9	-	-	V
			I _O =-20uA; V _{CC} =4.5V	4.4	-	-	V
			I _O =-20uA; V _{CC} =6.0V	5.9	-	-	V
			I _O =-4mA; V _{CC} =4.5V	3.7	-	-	V
			I _O =-5.2mA; V _{CC} =6.0V	5.2	-	-	V
LOW-level output voltage	V _{OL}	V _I = V _{IH} or V _{IL}	I _O =20uA; V _{CC} =2.0V	-	-	0.1	V
			I _O =20uA; V _{CC} =4.5V	-	-	0.1	V
			I _O =20uA; V _{CC} =6.0V	-	-	0.1	V
			I _O =4mA; V _{CC} =4.5V	-	-	0.4	V
			I _O =5.2mA; V _{CC} =6.0V	-	-	0.4	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =6.0V		-	-	±1.0	uA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =6.0V		-	-	160	uA
AiP74HCT123							
HIGH-level input voltage	V _{IH}	V _{CC} =4.5V to 5.5V		2.0	-	-	V
LOW-level input voltage	V _{IL}	V _{CC} =4.5V to 5.5V		-	-	0.8	V
HIGH-level output voltage	V _{OH}	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =-20uA	4.4	-	-	V
			I _O =-4mA	3.7	-	-	V
LOW-level output voltage	V _{OL}	V _I = V _{IH} or V _{IL} ; V _{CC} =4.5V	I _O =20uA	-	-	0.1	V
			I _O =4mA	-	-	0.4	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =5.5V		-	-	±1.0	uA



supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =5.5V		-	-	160	uA
additional supply current	ΔI _{CC}	per input pin; V _I =V _{CC} -2.1V; other inputs at V _{CC} or GND; V _{CC} =4.5V to 5.5V; I _O =0A	pins n $\bar{A}$, n $\bar{B}$	-	-	170	uA
			pin n $\bar{RD}$	-	-	245	uA

3.3.4、AC Characteristics 1

($T_{amb} = 25^\circ C$, voltages are referenced to GND (ground=0V); $C_L = 50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC123							
propagation delay	t _{pd}	nRD, nA, nB to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6 ^[1]	V _{CC} =2.0V	-	83	255	ns
			V _{CC} =4.5V	-	30	51	ns
			V _{CC} =5.0V; C _L =15pF	-	26	-	ns
			V _{CC} =6.0V	-	24	43	ns
		nRD(reset) to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =2.0V	-	66	215	ns
			V _{CC} =4.5V	-	25	43	ns
			V _{CC} =5.0V; C _L =15pF	-	20	-	ns
			V _{CC} =6.0V	-	19	37	ns
transition time	t _t	see Figure 6 ^[1]	V _{CC} =2.0V	-	19	75	ns
			V _{CC} =4.5V	-	7	15	ns
			V _{CC} =6.0V	-	6	13	ns
pulse width	t _w	nA LOW; see Figure 7	V _{CC} =2.0V	100	8	-	ns
			V _{CC} =4.5V	20	3	-	ns
			V _{CC} =6.0V	17	2	-	ns
		nB HIGH; see Figure 7	V _{CC} =2.0V	100	17	-	ns
			V _{CC} =4.5V	20	6	-	ns
			V _{CC} =6.0V	17	5	-	ns
		nRD LOW; see Figure 8	V _{CC} =2.0V	100	14	-	ns
			V _{CC} =4.5V	20	5	-	ns
			V _{CC} =6.0V	17	4	-	ns
		nQ HIGH and nQ LOW; V _{CC} =5.0V; see Figure 7, 8 ^[2]	C _{EXT} =100nF; R _{EXT} =10kΩ	-	450	-	us
C _{EXT} =0pF; R _{EXT} =5kΩ	-		75	-	ns		
retrigger time	t _{trig}	nA, nB; C _{EXT} =0pF; R _{EXT} =5kΩ; V _{CC} =5.0V; see Figure 7 ^{[3][4]}		-	110	-	ns
external timing resistor	R _{EXT}	see Figure 7	V _{CC} =2.0V	10	-	1000	kΩ
			V _{CC} =5.0V	2	-	1000	kΩ
external timing capacitor	C _{EXT}	V _{CC} =5.0V; see Figure 9 ^[4]		-	-	-	pF
power dissipation capacitance	C _{PD}	per monostable; V _I =GND to V _{CC} ^[5]		-	54	-	pF
AiP74HCT123							



HIGH to LOW propagation delay	t_{PHL}	$\overline{nRD}$, $\overline{nA}$, $\overline{nB}$ to $\overline{nQ}$ or $\overline{nQ}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	30	51	ns
			$V_{CC}=5V$; $C_L=15pF$	-	26	-	ns
		$\overline{nRD}(\text{reset})$ to $\overline{nQ}$ or $\overline{nQ}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	27	46	ns
			$V_{CC}=5V$; $C_L=15pF$	-	23	-	ns
LOW to HIGH propagation delay	t_{PLH}	$\overline{nRD}$, $\overline{nA}$, $\overline{nB}$ to $\overline{nQ}$ or $\overline{nQ}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	28	51	ns
			$V_{CC}=5V$; $C_L=15pF$	-	26	-	ns
		$\overline{nRD}(\text{reset})$ to $\overline{nQ}$ or $\overline{nQ}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	23	46	ns
			$V_{CC}=5V$; $C_L=15pF$	-	23	-	ns
transition time	t_t	$V_{CC}=4.5V$; see Figure 6 ^[1]		-	7	15	ns
pulse width	t_w	$V_{CC}=4.5V$	$\overline{nA}$ LOW; see Figure 7	20	3	-	ns
			$\overline{nB}$ HIGH; see Figure 7	20	5	-	ns
			$\overline{nRD}$ LOW; see Figure 8	20	7	-	ns
		$\overline{nQ}$ HIGH and $\overline{nQ}$ LOW; $V_{CC}=5.0V$; see Figure 7, 8 ^[2]	$C_{EXT}=100nF$; $R_{EXT}=10k\Omega$	-	450	-	us
			$C_{EXT}=0pF$; $R_{EXT}=5k\Omega$	-	75	-	ns
retrigger time	t_{rtrig}	$\overline{nA}$, $\overline{nB}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; $V_{CC}=5.0V$; see Figure 7 ^[3] ^[4]		-	110	-	ns
external timing resistor	R_{EXT}	$V_{CC}=5.0V$; see Figure 9		2	-	1000	k Ω
external timing capacitor	C_{EXT}	$V_{CC}=5.0V$; see Figure 9 ^[4]		-	-	-	pF
power dissipation capacitance	C_{PD}	per monostable; $V_I=GND$ to $V_{CC}-1.5V$ ^[5]		-	56	-	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL} ; t_t is the same as t_{THL} and t_{TLH} .

[2] For other R_{EXT} and C_{EXT} combinations see Figure 9. If $C_{EXT}>10nF$, the next formula is valid.

$t_w=K \times R_{EXT} \times C_{EXT}$, where:

t_w =typical output pulse width in ns;

R_{EXT} =external resistor in k Ω ; C_{EXT} =external capacitor in pF;

K =constant = 0.45 for $V_{CC}=5.0V$ and 0.55 for $V_{CC}=2.0V$.

The inherent test jig and pin capacitance at pins 15 and 7 (nR_{EXT}/C_{EXT}) is approximately 7pF.



[3] The time to retrigger the monostable multivibrator depends on the values of R_{EXT} and C_{EXT} . The output pulse width will only be extended when the time between the active-going edges of the trigger input pulses meets the minimum retrigger time. If $C_{EXT} > 10\text{pF}$,

the next formula (at $V_{CC}=5.0\text{V}$) for the setup time of a retrigger pulse is valid:

$t_{trig} = 30 + 0.19 \times R_{EXT} \times C_{EXT}^{0.9} + 13 \times R_{EXT}^{1.05}$, where:

t_{trig} =retrigger time in ns;

C_{EXT} =external capacitor in pF; R_{EXT} =external resistor in k Ω .

The inherent test jig and pin capacitance at pins 15 and 7 (nREXT/CEXT) is 7pF.

[4] When the device is powered-up, initiate the device via a reset pulse, when $C_{EXT} < 50\text{pF}$.

[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) + 0.75 \times C_{EXT} \times V_{CC}^2 \times f_o + D \times 16 \times V_{CC}$ where:

f_i =input frequency in MHz; f_o =output frequency in MHz;

D =duty factor in %; C_L =output load capacitance in pF;

V_{CC} =supply voltage in V;

C_{EXT} =timing capacitance in pF;

$\sum (C_L \times V_{CC}^2 \times f_o)$ =sum of outputs.

3.3.5、AC Characteristics 2

($T_{amb} = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $GND=0\text{V}$; $C_L=50\text{pF}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC123							
propagation delay	t _{pd}	nRD, nA, nB to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6 ^[1]	V _{CC} =2.0V	-	-	320	ns
			V _{CC} =4.5V	-	-	64	ns
			V _{CC} =6.0V	-	-	54	ns
		nRD(reset) to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =2.0V	-	-	270	ns
			V _{CC} =4.5V	-	-	54	ns
			V _{CC} =6.0V	-	-	46	ns
transition time	t _t	see Figure 6 ^[1]	V _{CC} =2.0V	-	-	95	ns
			V _{CC} =4.5V	-	-	19	ns
			V _{CC} =6.0V	-	-	16	ns
pulse width	t _w	nA LOW; see Figure 7	V _{CC} =2.0V	125	-	-	ns
			V _{CC} =4.5V	25	-	-	ns
			V _{CC} =6.0V	21	-	-	ns
		nB HIGH; see Figure 7	V _{CC} =2.0V	125	-	-	ns
			V _{CC} =4.5V	25	-	-	ns
			V _{CC} =6.0V	21	-	-	ns
		nRD LOW; see Figure 8	V _{CC} =2.0V	125	-	-	ns
			V _{CC} =4.5V	25	-	-	ns
			V _{CC} =6.0V	21	-	-	ns
AiP74HCT123							



HIGH to LOW propagation delay	t_{PHL}	$\overline{nRD}$, $\overline{nA}$, nB to $\overline{nQ}$ or $n\overline{Q}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	-	64	ns
		$\overline{nRD}(\text{reset})$ to $\overline{nQ}$ or $n\overline{Q}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	-	58	ns
LOW to HIGH propagation delay	t_{PLH}	$\overline{nRD}$, $\overline{nA}$, nB to $\overline{nQ}$ or $n\overline{Q}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	-	64	ns
		$\overline{nRD}(\text{reset})$ to $\overline{nQ}$ or $n\overline{Q}$; $C_{EXT}=0pF$; $R_{EXT}=5k\Omega$; see Figure 6	$V_{CC}=4.5V$	-	-	58	ns
transition time	t_t	$V_{CC}=4.5V$; see Figure 6 ^[1]		-	-	19	ns
pulse width	t_w	$V_{CC}=4.5V$	$\overline{nA}$ LOW; see Figure 7	25	-	-	ns
			nB HIGH; see Figure 7	25	-	-	ns
			$\overline{nRD}$ LOW; see Figure 8	25	-	-	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL} ; t_t is the same as t_{THL} and t_{TLH} .



3.3.6、AC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $GND=0V$; $C_L=50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC123							
propagation delay	t _{pd}	nRD, nA, nB to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6 ^[1]	V _{CC} =2.0V	-	-	385	ns
			V _{CC} =4.5V	-	-	77	ns
			V _{CC} =6.0V	-	-	65	ns
		nRD(reset) to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =2.0V	-	-	325	ns
			V _{CC} =4.5V	-	-	65	ns
			V _{CC} =6.0V	-	-	55	ns
transition time	t _t	see Figure 6 ^[1]	V _{CC} =2.0V	-	-	110	ns
			V _{CC} =4.5V	-	-	22	ns
			V _{CC} =6.0V	-	-	19	ns
pulse width	t _w	nA LOW; see Figure 7	V _{CC} =2.0V	150	-	-	ns
			V _{CC} =4.5V	30	-	-	ns
			V _{CC} =6.0V	26	-	-	ns
		nB HIGH; see Figure 7	V _{CC} =2.0V	150	-	-	ns
			V _{CC} =4.5V	30	-	-	ns
			V _{CC} =6.0V	26	-	-	ns
		nRD LOW; see Figure 8	V _{CC} =2.0V	150	-	-	ns
			V _{CC} =4.5V	30	-	-	ns
			V _{CC} =6.0V	26	-	-	ns
AiP74HCT123							
HIGH to LOW propagation delay	t _{PHL}	nRD, nA, nB to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =4.5V	-	-	77	ns
		nRD(reset) to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =4.5V	-	-	69	ns
LOW to HIGH propagation delay	t _{PLH}	nRD, nA, nB to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =4.5V	-	-	77	ns
		nRD(reset) to nQ or nQ; C _{EXT} =0pF; R _{EXT} =5kΩ; see Figure 6	V _{CC} =4.5V	-	-	69	ns



transition time	t_t	$V_{CC}=4.5V$; see Figure 6 ^[1]		-	-	22	ns
pulse width	t_w	$V_{CC}=4.5V$	nA LOW; see Figure 7	30	-	-	ns
			nB HIGH; see Figure 7	30	-	-	ns
			nRD LOW; see Figure 8	30	-	-	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL} ; t_t is the same as t_{THL} and t_{TLH} .

4、Testing Circuit

4.1、AC Testing Circuit

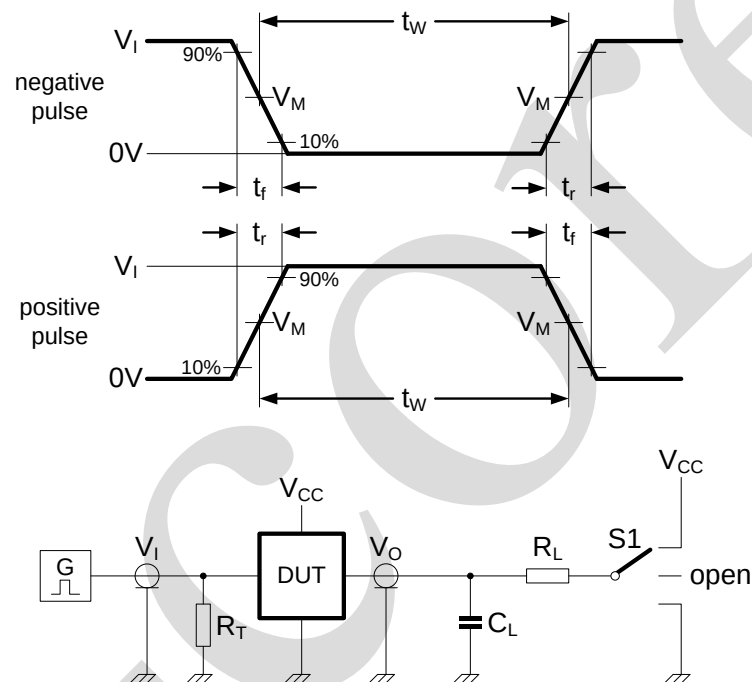


Figure 5. Test circuit for measuring switching times

Definitions for test circuit:

R_L =Load resistance.

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to the output impedance Z_o of the pulse generator.

S1=Test selection switch.

4.2、 AC Testing Waveforms

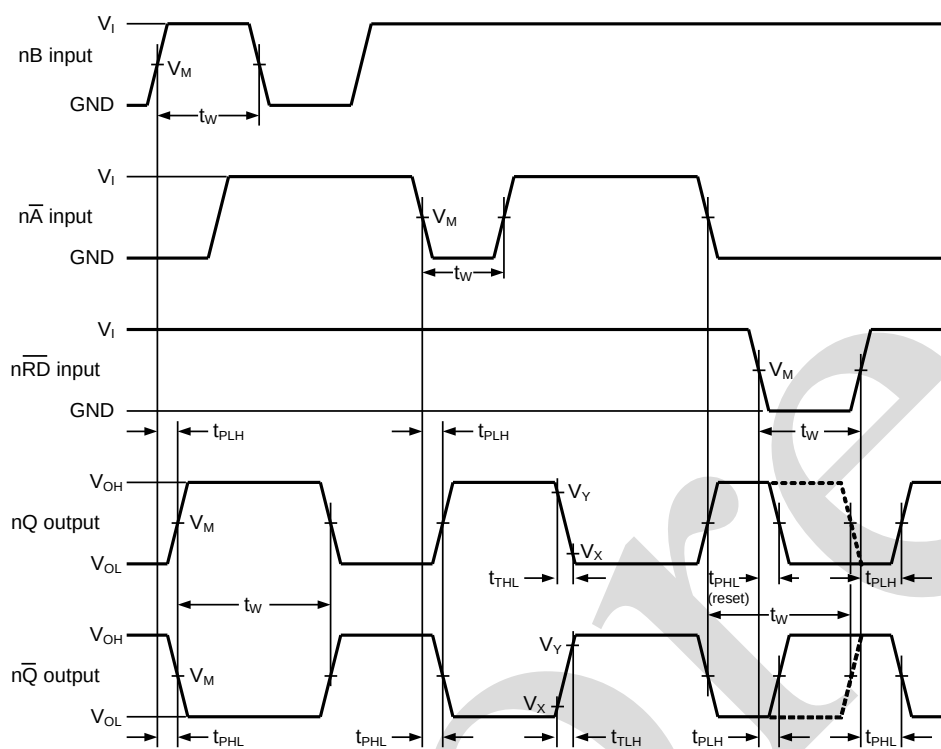


Figure 6. Propagation delays from inputs ($\bar{n}A$, nB , $\bar{n}RD$) to outputs (nQ , $\bar{n}Q$) and output transition times

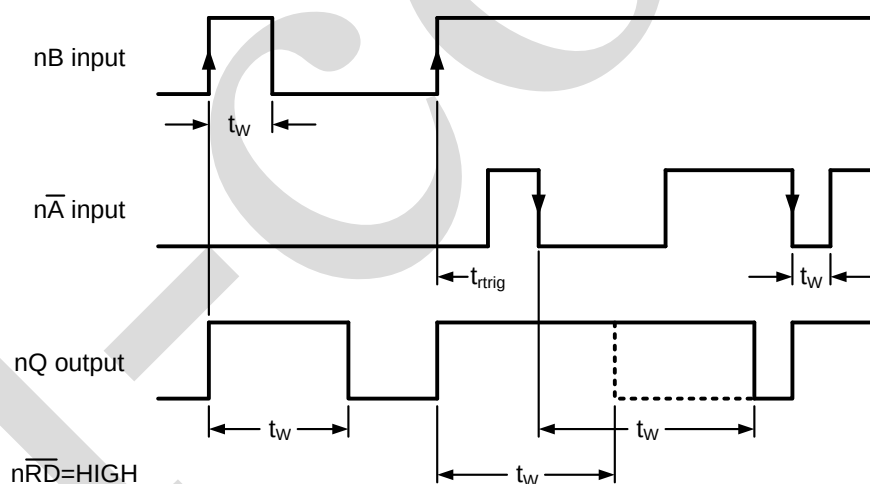


Figure 7. Output pulse control using retrigger pulse

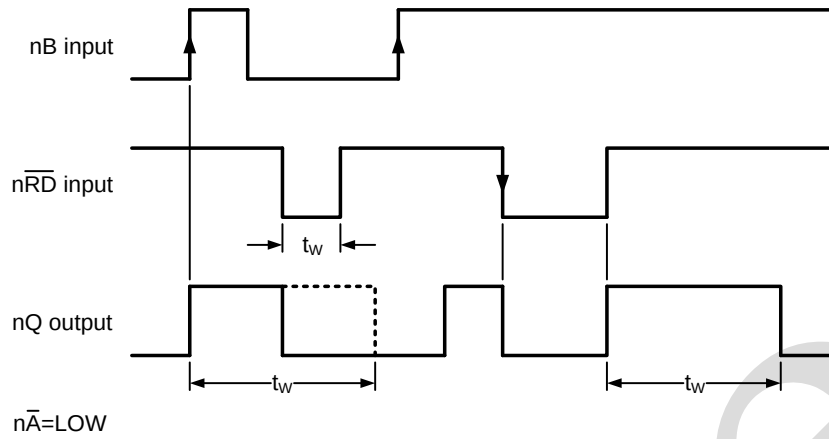
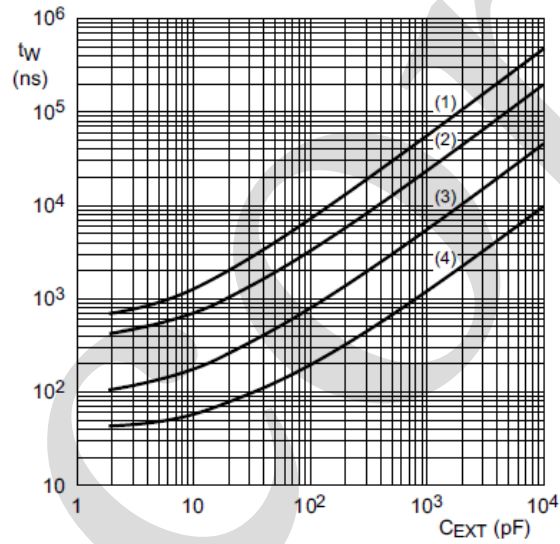


Figure 8. Output pulse control using reset input $\overline{nRD}$



$V_{CC}=5.0V$; $T_{amb}=25^{\circ}C$.

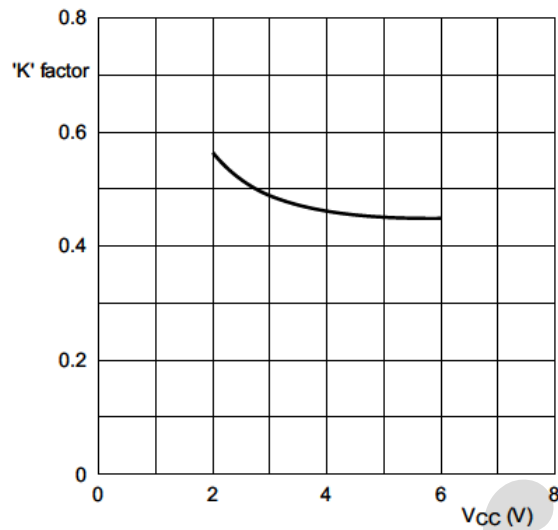
(1) $R_{EXT}=100k\Omega$

(2) $R_{EXT}=50k\Omega$

(3) $R_{EXT}=10k\Omega$

(4) $R_{EXT}=2k\Omega$

Figure 9. Typical output pulse width as a function of the external capacitor value



$C_{EXT}=10\text{nF}$; $R_{EXT}=10\text{k}\Omega$ to $100\text{k}\Omega$. $T_{amb}=25^{\circ}\text{C}$.

Figure 10. AiP74HC123 typical 'K' factor as function of V_{CC}

4.3、 Measurement Points

Type	Input	Output
	V_M	V_M
AiP74HC123	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
AiP74HCT123	1.3V	1.3V

4.4、 Test Data

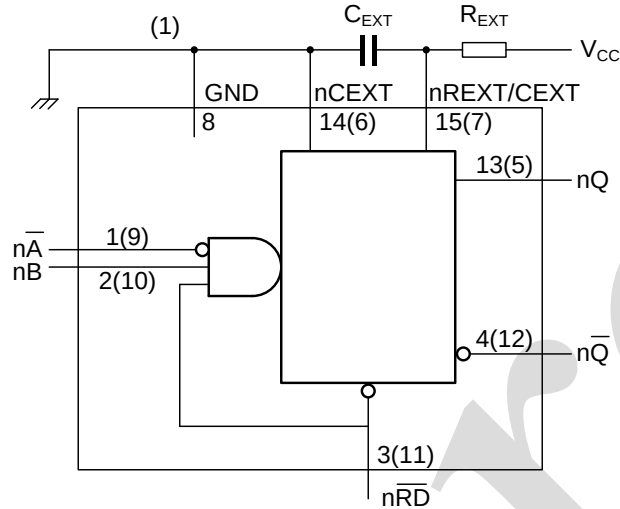
Type	Input		Load		S1 position
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}
AiP74HC123	V_{CC}	6ns	15pF, 50pF	1k Ω	open
AiP74HCT123	3V	6ns	15pF, 50pF	1k Ω	open



5、Typical Application Circuit And Application Note

5.1、Timing component connections

The basic output pulse width is essentially determined by the values of the external timing components R_{EXT} and C_{EXT} .



(1) For minimum noise generation it is recommended to ground pins 6 ($2C_{EXT}$) and 14 ($1C_{EXT}$) externally to pin 8 (GND).

Figure 11. Timing component connections

5.2、Power-up considerations

When the monostable is powered-up it may produce an output pulse, with a pulse width defined by the values of R_{EXT} and C_{EXT} . This output pulse can be eliminated using the circuit shown in Figure 12.

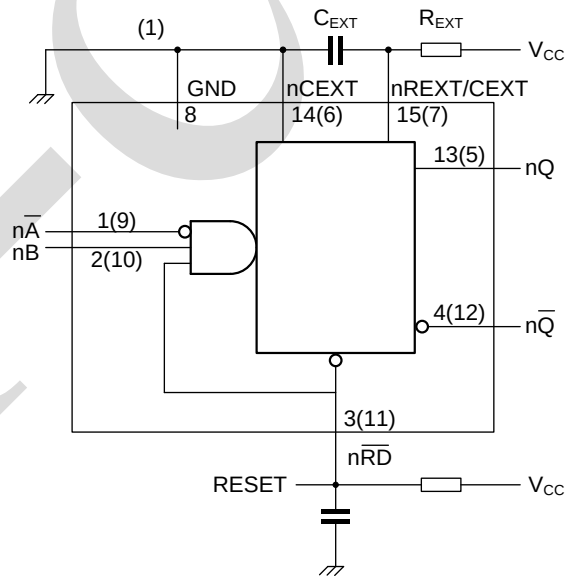


Figure 12. Power-up output pulse elimination circuit



5.3、Power-down considerations

A large capacitor C_{EXT} may cause problems when powering-down the monostable due to the energy stored in this capacitor. When a system containing this device is powered-down or a rapid decrease of V_{CC} to zero occurs, the monostable may sustain damage, due to the capacitor discharging through the input protection diodes. To avoid this possibility, use a damping diode (D_{EXT}) preferably a germanium or Schottky type diode able to withstand large current surges and connect as shown in Figure 13.

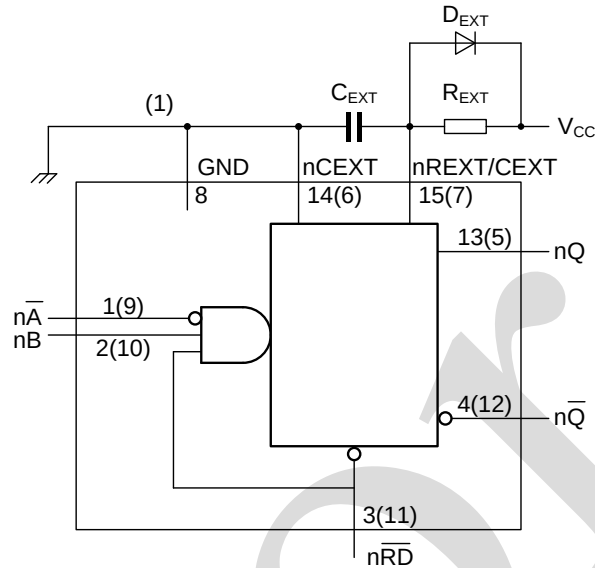
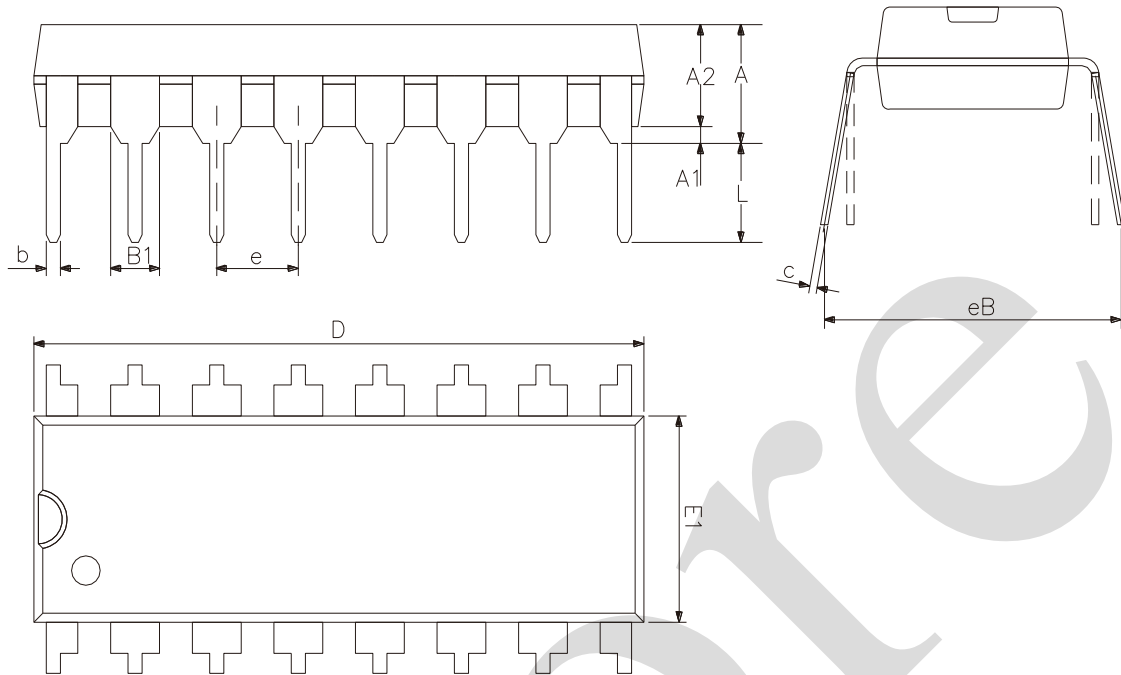


Figure 13. Power-down protection circuit



6、Package Information

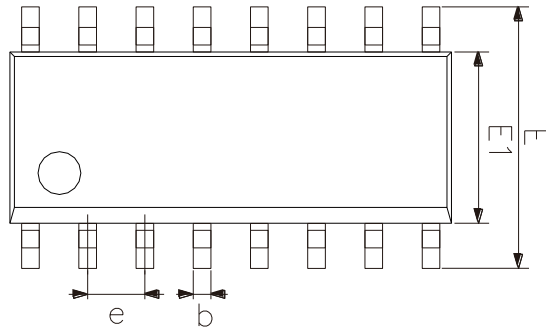
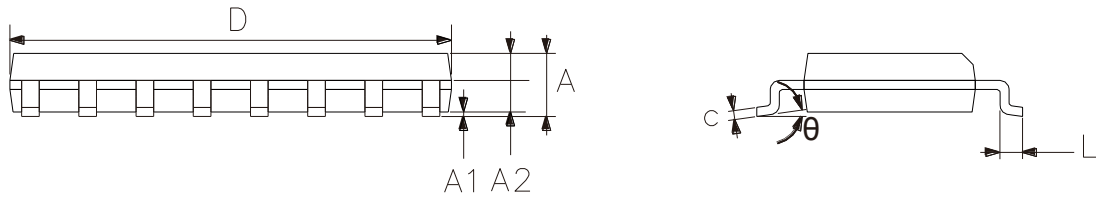
6.1、DIP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A2	3.00	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30



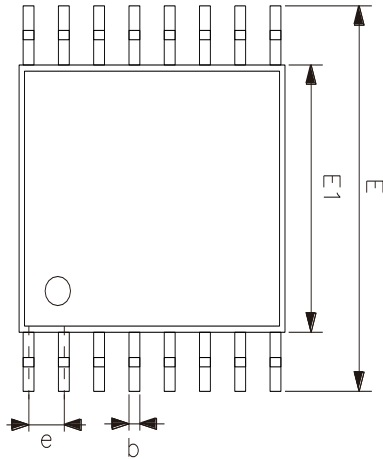
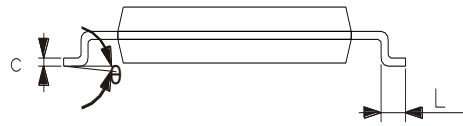
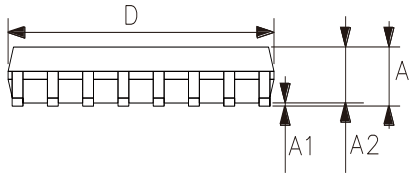
6.2、SOP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.35	1.80
A1	0.10	0.25
A2	1.25	1.55
b	0.33	0.51
c	0.19	0.25
D	9.50	10.10
E	5.80	6.30
E1	3.70	4.10
e	1.27	
L	0.35	0.89
θ	0°	8°



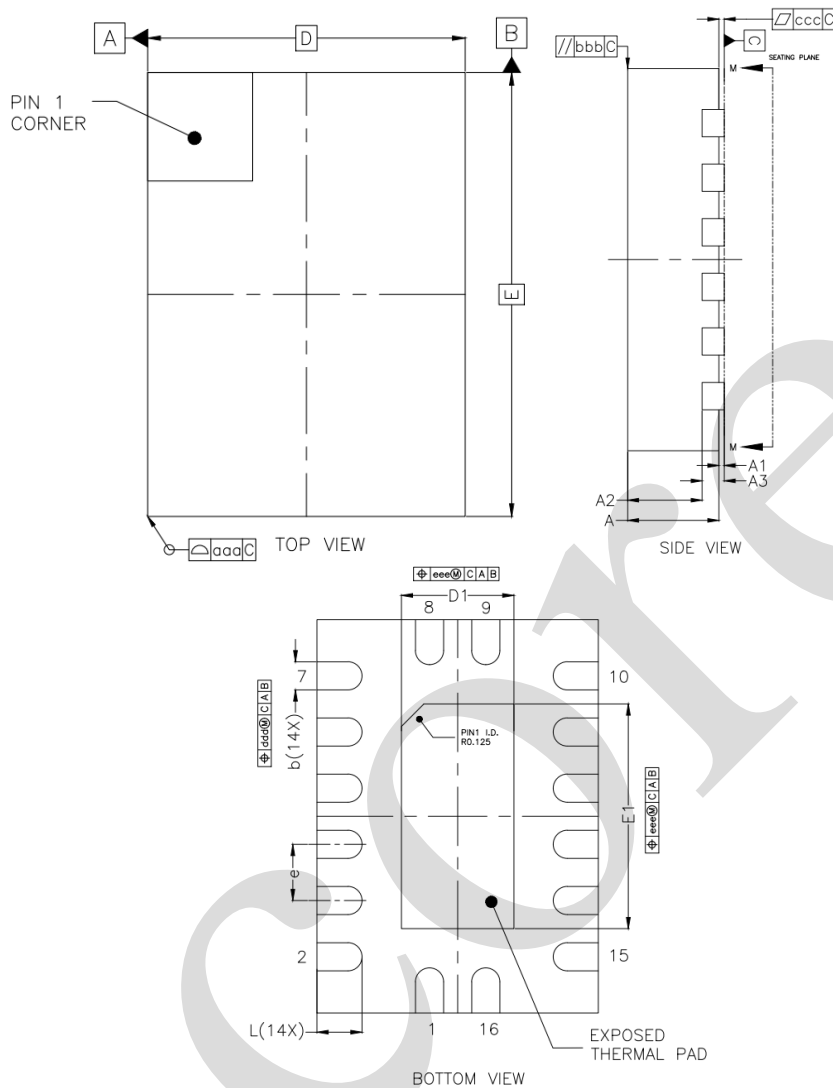
6.3、TSSOP16



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
θ	0°	8°



6.4、DHVQFN16



2023/12/A	Dimensions In Millimeters	
	Symbol	Min Max
	A	0.80 1.00
	A1	0.00 0.05
	A2	0.60 0.70
	A3	0.20
	D	2.40 2.60
	E	3.40 3.60
	e	0.50
	b	0.18 0.30
	L	0.30 0.50
	D1	0.85 1.15
	E1	1.85 2.15



7、Statements And Notes

7.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

7.2、Notes

We recommend you to read this chapter carefully before using this product.

The information in this chapter is provided for reference only and i-Core disclaims any express or implied warranties, including but not limited to applicability, special application or non-infringement of third party rights.

This product is not suitable for critical equipment such as life-saving, life-sustaining or safety equipment. It is also not suitable for applications that may result in personal injury, death, or serious property or environmental damage due to product malfunction or failure. I-Core will not be liable for any damages incurred by the customers at their own risk for such applications.

The customer is responsible for conducting all necessary tests i-Core's application to avoid failure in the application or the application of the customer's third party users. I-Core does not accept any liability.

The Company reserves the right to change or improve the information published in this chapter at any time. The information in this chapter are subject to change without notice. We recommend the customer to consult our sales staff before purchasing.

Please obtain related materials from i-Core's regular channels and we are not responsible for its content if it is provided by sources other than our company.

In case of any conflict between the Chinese and English version, the version is subject to the Chinese one.